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How Low Will Corn Prices Go?

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How Low Will Corn Prices Go?

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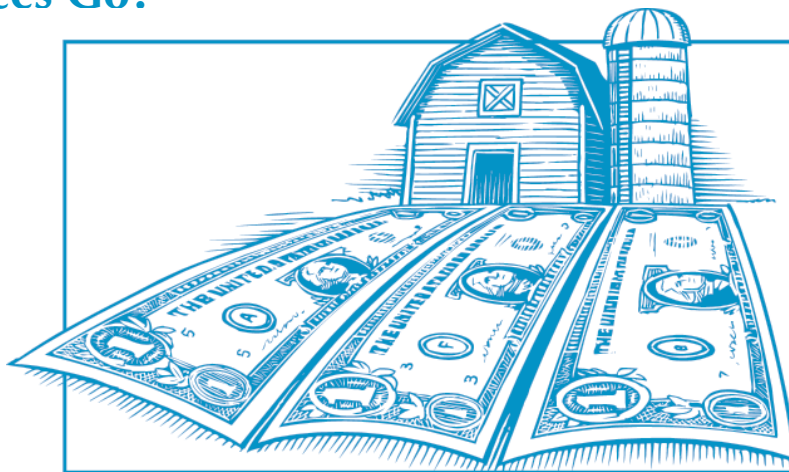
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The recent dramatic decline in crop prices is a boon for livestock producers but a bust for crop producers, particularly for producers who just agreed to pay high rents. More generally, the tremendous volatility in all commodity markets makes it nearly impossible for producers and the food industry to plan for the future. But farmers need to begin planning for their 2009 crop, and food producers need to make procurement plans for the remainder of this marketing year. The type of plan that will be profitable depends on the answers to a number of key questions: Have we seen the end of high corn prices? Will prices continue to decline, and if so, how low will they go? Have we seen the end of the food versus fuel debate?

Making predictions about commodity prices in such a volatile market may seem foolhardy. However, there are key factors that can be examined to gain insight into where prices may be headed. But before we examine these factors, it is instructive to review exactly how the market price of corn—the major feedstock for ethanol—is determined.

Determining the Market Price of Corn

Corn is fed to domestic livestock, converted into ethanol, fed to livestock in export markets, and used as a food ingredient. Each user within these groups has a maximum price he or she can pay for corn. This maximum price is the threshold price that if exceeded causes the user's demand for corn to fall



to zero. That is, the user shuts the operation down or switches to an alternative to corn.

The market price of corn is determined by the user with the lowest maximum price such that the total demand for corn at this price equals the total supply of corn. This last user is often referred to as the marginal user of corn. Most domestic livestock feeders have a very high maximum price they can pay for corn because they must keep their animals alive and alternative feeds are generally priced relative to the corn price. Food manufacturers also have a high willingness to pay for corn because corn represents such a small share of their total costs. This high willingness to pay for corn explains why corn prices can climb so dramatically when shortages occur. Conversely, when corn supplies are plentiful, the price of corn can drop dramatically because there are not many important corn users with a low maximum price of corn.

Prediction of corn prices is difficult in any year because we cannot know for certain which user of corn will be the user with the lowest maximum price. Looking at the 2009 crop, we do not know who the marginal user will be because we do not know what total supply will be.

However, we may find some clues about who the marginal user in 2009 will be by looking at projected supply and demand balances for both 2008 and 2009.

Non-Ethanol Users of Corn

The USDA projects that in the 2008 marketing year, the domestic livestock industry will consume about 5.4 billion bushels of corn, corn exports will be about 2 billion bushels, and other uses (food, seed, and non-fuel industrial) will be about 1.3 billion bushels. Because the variation in the maximum willingness to pay for corn by the domestic livestock industry and by the food and seed sectors is not high, we can treat their 2009 demands as approximately fixed at these levels. Potential importers of U.S. corn in 2009 have more variation in their maximum willingness to pay for corn, so export numbers will vary somewhat with U.S. supplies.

These three demand sources, most of which have a very high maximum willingness to pay for corn, sum to 8.7 billion bushels. This means that if the supply of corn in 2009 falls below 8.7 billion bushels, then the price of corn will skyrocket. In fact, supplies will need to be much greater than 8.7 billion ➡

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bushels to avoid high corn prices because demand from the ethanol sector has not yet been accounted for.

Ability of Ethanol Producers to Pay for Corn

The maximum price of corn for ethanol producers is the price above which they begin to lose money. For a time, ethanol plants will buy corn so long as they cover all their operating costs. In the longer run, though, they must also cover their capital costs. Ethanol plants sell ethanol and distillers grains and buy corn, natural gas, electricity, and labor. Given representative operating cost estimates and the relationship between the price of distillers grains and the price of corn, it is straightforward to calculate the price of corn that just covers operating costs. Table 1 shows the maximum price of corn that an efficient ethanol producer can pay at various ethanol prices. As shown, a 50¢ change in the price of ethanol changes the operator's ability to pay for corn by \$1.93 per bushel.

In the corn marketing year that just ended on August 31, domestic livestock feeders, food users, and importers used about 10 billion bushels of corn. Corn production

Table 1. Break-even prices of corn

Price of Ethanol \$/gallon	Break-Even Price of Corn \$/bushel
1.00	1.73
1.50	3.66
2.00	5.59
2.50	7.51
3.00	9.44

was about 13 billion bushels. Ethanol producers used the difference, about 3 billion bushels. If non-ethanol users last year had high maximum prices for corn, then the ethanol industry was the marginal user of corn. If ethanol was the marginal user, then the market price of corn should be determined by ethanol producers' ability to pay for corn.

Figure 1 shows the ethanol industry's break-even corn prices and actual market prices since March of 2005. Note that before the fall of 2006, there is no evidence that the ethanol industry was the marginal user of corn. The reason is that corn supplies were more than adequate to supply the industry. During this period, the export market was likely the marginal user of corn. The

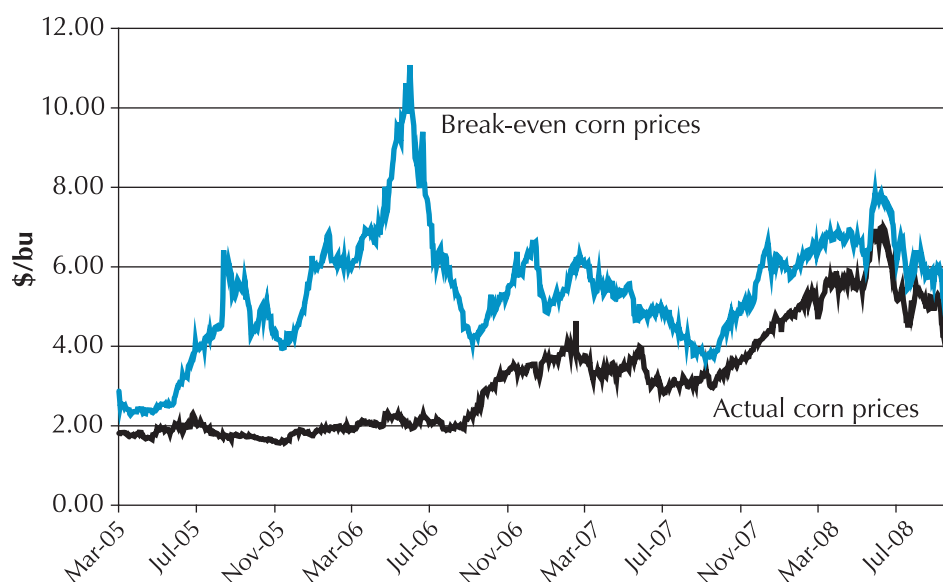


Figure 1. Break-even and actual corn prices

large gap between the break-even corn prices and actual corn prices explains why it was so profitable to produce ethanol during this time.

More recently, there is a much closer relationship between the ability to pay for corn to produce ethanol and the price of corn. Since the fall of 2007, it is clear that the ethanol industry has been the marginal user of corn. Variations in the break-even price of corn explain about 85 percent of the variation in the price of corn over the last year. The remaining variation is largely accounted for by uncertainty about the size of the 2008 crop. Note also that the difference between the break-even corn price and the actual corn price has been narrowing over time. This narrowing illustrates the very tight margins that currently exist in the ethanol industry.

The marginal user of corn for the remainder of the current marketing year (ending July 31, 2009) will either be the ethanol industry or speculators who will buy corn and store it until the following year if corn prices get too low. If the ethanol industry is the marginal user then to predict the market price of corn, all we need to do is predict the break-even price of corn in the ethanol industry.

Predicting the Ethanol Industry's Ability to Pay for Corn

The key factor that determines the ethanol industry's ability to pay for corn is the price of ethanol. Because ethanol is a substitute for gasoline and because the price of gasoline closely follows the price of crude oil, it seems logical that knowing the price of crude oil alone should allow us to predict the price of ethanol. But the relationship between crude oil and ethanol prices is not that straightforward. As shown in Figure 2, the variable relationship between gasoline and ethanol prices complicates matters. Before April of 2007, ethanol prices were higher than gasoline prices. Since April

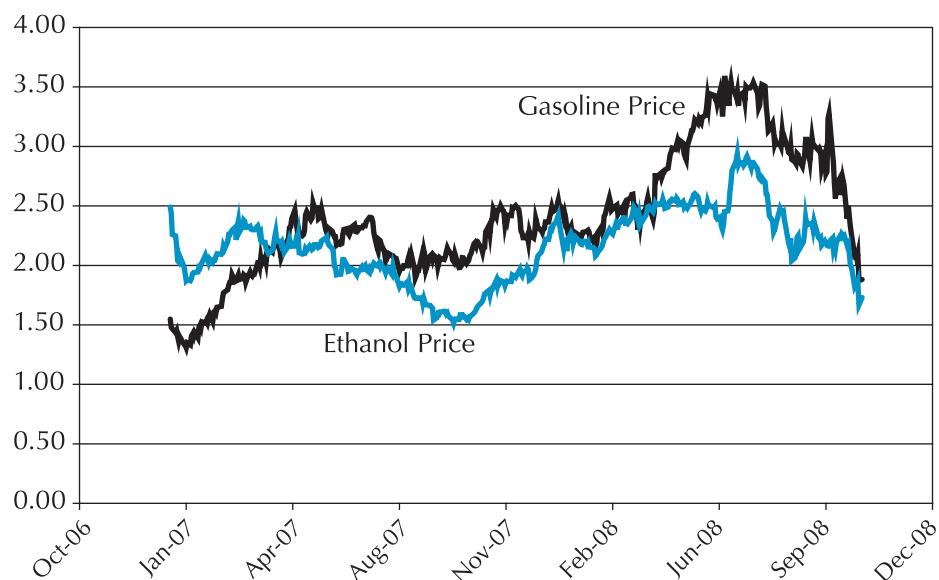


Figure 2. Relationship between gasoline and ethanol prices

of 2008, ethanol prices have been much lower than gasoline prices. One explanation for this change is that the rapid expansion in ethanol production has forced ethanol to compete directly with gasoline as a substitute fuel, and the price of ethanol has been forced down to create an incentive for blenders in the Southeast to expand their blending infrastructure.

An equation that has been used to predict prices sets the price of ethanol at 68 percent of the price of gasoline (to account for ethanol's lower energy value) plus the blenders tax credit (to account for the per gallon benefit of the ethanol subsidy). But this equation has over-predicted the price of ethanol by about 8 percent since June of 2008.

If ethanol continues to be priced 8 percent below its energy value, then if we know the wholesale price of gasoline, we can predict the price of corn. Table 2 provides these estimates for crude oil prices between \$50 and \$120 per barrel, accounting for the recent wedge between calculated break-even corn prices and actual corn prices shown in Figure 1. If crude oil prices stabilize at \$80 per barrel, the price of corn will stabilize

Table 2. Predictions of corn prices for alternative crude oil prices

Price of:			
Crude \$/barrel	Gasoline \$/gallon	Ethanol \$/gallon	Corn \$/bu
50	1.26	1.20	2.18
60	1.52	1.36	2.71
70	1.77	1.52	3.24
80	2.02	1.67	3.77
90	2.27	1.83	4.30
100	2.53	1.99	4.82
110	2.78	2.15	5.35
120	3.03	2.30	5.88

at approximately \$3.77 per bushel. As shown, if crude oil climbs once again to \$120 per barrel, then we should see corn prices climb again to the \$6.00-per-bushel mark.

The estimates in Table 2 should be alarming to corn farmers: if crude oil falls to \$50 per barrel, then the ability to pay for corn by the ethanol industry will fall back to around \$2.15 per bushel. Because this price is much lower than current production costs, crop farmers would face severe financial stress. But we should never see corn prices

Continued on page 11

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drop this much, even if crude oil does drop to \$50 per barrel. The reason is that at such a low corn price, speculators would likely move into the market to buy corn for delivery in the 2009 marketing year. Furthermore, at \$2.15 per bushel corn farmers would not plant enough corn in 2009 to meet the almost 13-billion-bushel demand.

Backstopping Prices with Ethanol Mandates

Under the new Renewable Fuels Standard, U.S. gasoline blenders must blend 10.5 billion gallons of ethanol in the 2009 calendar year. In 2010, this mandate increases to 12 billion gallons. This means that 11.5 billion gallons must be produced from 2009 corn supplies. With crude oil at \$50 per barrel, it is doubtful that Brazil will export large amounts of ethanol to the United States because of the import tariff, so the

U.S. ethanol industry will need to produce much of this amount. An ethanol level of 11.5 billion gallons requires 4.2 billion bushels of corn. With at least 8.7 billion bushels of non-fuel demand for corn, 12.9 billion bushels of corn will be needed in 2009. At a trend yield of 154 bushels per acre, this will require 83 million harvested acres or about 90 million planted acres. Simply put, U.S. farmers will not plant 90 million acres of corn if the price of corn is \$2.15 per bushel because this corn price would not cover the additional production costs of planting corn after corn. Given recent experience, it will likely take a price of more than \$3.50 or \$4.00 per bushel to induce farmers to plant the required acres. At \$2.00 corn, the United States would be lucky to see 75 million acres planted.

So what is the outlook for corn prices? If crude oil prices rise, so too will corn prices. If crude oil prices fall, corn prices will fall through the remainder of the 2008 market-

ing year, but only to a point. They cannot fall too far because speculators would move into the market. Recall that 2009 prices must be high enough to induce farmers to plant enough acres in 2009 to meet ethanol mandates. Thus, there is a limit to how far 2008 prices can go before corn buyers will begin to buy 2008 corn for delivery at the 2009 prices. At this point, 2008 prices will not fall any further.

The bottom line is that ethanol mandates place an effective floor under corn (and soybean) prices. This floor price is particularly relevant for new-crop futures prices before the 2009 crop is planted because of the need to buy corn acres to meet ethanol mandates. Post-planting prices will reflect crude oil prices and expectations about corn yields. Farmers looking to 2009 should look at their own costs and returns to figure out how high corn prices will need to be to ensure that 90 million acres of corn are planted in 2009. ♦

*Splashing and Dashing Biodiesel**Continued from page 7*

Additionally, the decision about whether or not to restrict the subsidy to only biodiesel consumed in the United States will have a large impact on the biodiesel industry because the export market is taking an increasingly large proportion of production.

Sorting Policy Impacts

Available data indicate that a large proportion of the biodiesel

imported into the United States is later re-exported to the European Union. The E.U. market is also the main outlet for much of the biodiesel produced in the United States. Together, these export volumes explain why E.U. producers have been so opposed to U.S. biodiesel subsidies. While E.U. producers have sound reasons to protest, U.S. taxpayers should also know that they are subsidizing biofuels that allow the European Union to meet its biofuels targets at a lower cost. When evaluating alternative policy options

for addressing the splash-and-dash controversy, an essential question to ask is, Do the benefits to U.S. taxpayers from a domestic biodiesel industry outweigh the costs of subsidizing biodiesel produced or consumed in other countries?

For More Information

See the article by Erin Voegelé, "EU Launches Investigation of U.S. Biodiesel Industry," *Biodiesel Magazine*, July 2008. ♦